Trithorax and Polycomb methyltransferase complexes in cell fate determination.

Grant Award Details

Trithorax and Polycomb methyltransferase complexes in cell fate determination.

Grant Type: New Faculty I

Grant Number: RN1-00579

Project Objective: The goal of this project is to interrogate the mechanisms by which Trithorax and Polycomb methyltransferase complexes control cell fate determination in ESC and neural cells derived from them.

Investigator:

Name:	Joanna Wysocka
Institution:	Stanford University
Type:	PI

Human Stem Cell Use: Embryonic Stem Cell

Award Value: $2,373,903

Status: Closed

Progress Reports

Reporting Period: Year 2

View Report

Reporting Period: Year 3

View Report

Reporting Period: Year 4

View Report

Reporting Period: Year 5

View Report

Grant Application Details

Application Title: Trithorax and Polycomb methyltransferase complexes in cell fate determination.

Public Abstract: The physiological template of our genome, called chromatin, is composed of DNA wrapped around histone proteins. In the process of development the genome is interpreted in a way that is dynamic, and yet, often heritable, to produce different specialized tissues and organs. A substantial portion of information that is required for proper interpretation of the genome is transmitted in a form of methylation of histones and associated DNA. Methylation marks are written by specific enzymatic activities, called methyltransferases. Different methyltransferases can activate or repress genes, and the right balance between the two is critical for proper execution of the developmental programs. Thus, not surprisingly, deregulation of methyltransferases leads to human disease, most notably cancer.

Here we propose to address how the interplay between “activating” and “silencing” methylation signals regulates gene expression patterns in embryonic stem cells and during their differentiation along the neural lineage. These studies will advance our knowledge of the unique properties of chromatin in embryonic stem cells and will address the mechanisms of gene expression during neural commitment. This basic science foundation will be necessary for development of efficient protocols to direct the differentiation of stem cells into therapeutically useful neural tissues. In addition to advancing basic knowledge, our studies will lead to development of novel technology that takes advantage of the latest developments in bioengineering and proteomics. This technology will be broadly applicable in studies of stem and progenitor cells, human and from different model organisms and will push stem cell research forward.

Statement of Benefit to California: We believe the proposed research will benefit people of California in the following ways:

It will result in development of novel technology that will be broadly applicable to study different stem and progenitor cells and will help position us and other Californian scientists at the forefront of stem cell research.

It will help uncover unique biological properties of embryonic stem cells.

It will generate wealth of information on novel molecules involved in embryonic stem cell pluripotency and differentiation. This information will provide a foundation for development of stem cell-based therapies.

It will increase experience and knowledge of embryonic stem cells among residents of California. This project involves cooperation between three laboratories with complementary expertise. The interaction will facilitate skill exchange and staff training in cutting edge multidisciplinary approaches.